

Amendment "D" page 2 of 8  
09/465,131

DOCKET NO. 99-099/RCE  
65611

REMARKS

Claims 1-7 remain pending in the application.

Reconsideration and examination of Claims 1-7 in view of the arguments below is respectfully requested.

By way of this response, Applicant has made a diligent effort to place the claims in condition for allowance. However, should there remain any outstanding issues that require adverse action, it is respectfully requested that the examiner telephone Leo J. Peters at (408)433-4578 so that such issues may be resolved as expeditiously as possible.

Claims 1, 4 and 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over admitted prior art (APA) and U.S. Patent 6,321,175 filed on December 21, 1998, by Nagaraj (Nagaraj). Applicant traverses the rejection as follows.

In section 2, page 3, the rejection argues that Nagaraj discloses locating a thermal sensor (20) on the top side (18) of a printed circuit board (10) at column 4, lines 28-30, and concludes that locating the thermal sensor (20) on the top side (18) of the printed circuit board (10) is "considered to be" the claimed securing of the thermocouple directly to the active circuit surface of a semiconductor die.

The rejection errs in confusing the top side (18) of the printed circuit board (10) in FIG. 5 of Nagaraj with the claimed active circuit surface of a semiconductor die. The top side (18) of the printed circuit board (10) includes a system controller integrated circuit (25). However, Nagaraj clearly does not teach securing the thermal sensor (20)

Amendment "D" page 3 of 8  
09/465,131

DOCKET NO. 99-099/RCE  
65611

directly to the active circuit surface of the die of the system controller integrated circuit (25). Because locating the thermal sensor (20) on the top side of the printed circuit board (10) as taught in Nagaraj does not teach or suggest all the claim limitations of securing the thermocouple directly to the active circuit surface of a semiconductor die, the rejection fails to establish *prima facie* obviousness of Claims 1, 4 and 5 under 35 U.S.C. § 103(a) as explained at MPEP § 2143.03:

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)."

Further, in column 4, lines 19-30, Nagaraj expressly teaches away from the claimed invention as follows:

"It should be noted that the ambient temperature sensing capability for exemplary thermal sensor 20 is more accurate when closely coupled to the ground connection of the device to be measured. Thus, the placement of the thermal sensor 20 on the bottom side 19 of the printed circuit board 10 facilitates the accurate temperature measurement of system controller 25, which, in this example, has its ground interconnections located in the center portion of the device (see FIGS. 4 and 5). If the ground interconnections were located on the perimeter of the device, thermal sensor 20 could be located, for

Amendment "D" page 4 of 8  
09/465,131

DOCKET NO. 99-099/RCE  
65611

example, on the top side 18 of the printed circuit board 10 without excessive loss of measurement accuracy."

In contrast to securing the thermocouple directly to the active circuit surface of the die of the system controller integrated circuit (25), Nagaraj teaches locating the thermal sensor (20) on either side of the printed circuit board (10). If the thermal sensor (20) is mounted on the bottom side (19) of the printed circuit board (10), then the printed circuit board (10) separates the die of the system controller integrated circuit (25) from the thermal sensor (20). The rejection proposes the option of locating the thermocouple on the top side (18) of the printed circuit board (10) as taught by Nagaraj and alleges that this arrangement would arrive at the claimed invention. However, the location Nagaraj suggests on the top side (18) of the printed circuit board (10) is clearly not directly on the active circuit surface of the die of the system controller (25), because Nagaraj teaches that locating the thermocouple on the top side (18) of the printed circuit board (10) results in at least some loss of measurement accuracy compared to locating the thermal sensor (20) on the bottom side (19) (column 4, lines 28-30). According to the teaching of Nagaraj, the loss of measurement accuracy implies that the location on the top side of the printed circuit board (10) is even farther from the ground connections to the die of the system controller (25) and consequently farther from the active circuit surface of the die than is the preferred location on the bottom side of the printed circuit board (10). Because neither of the locations disclosed in Nagaraj is directly on the active circuit surface of the die of the system controller (25), the modification proposed by the rejection fails to arrive at the claimed

Amendment "D" page 5 of 8  
09/465,131

DOCKET NO. 99-099/RCE  
65611

invention.

Even if the modification proposed by the rejection would arrive at the claimed invention, the loss of accuracy is motivation not to make the proposed modification. Nagaraj teaches that the proposed arrangement of locating the thermal device (20) on the top side (18) of the printed circuit board (10) results in a loss of accuracy compared to locating the thermal sensor (20) on the bottom side of the printed circuit board (10) as illustrated in the preferred embodiment of FIG. 5. Because Nagaraj teaches that locating the thermal sensor (20) on the top side (18) of the printed circuit board (10) results in a loss of accuracy in measuring the temperature of the integrated circuit device (25), Nagaraj clearly teaches away from locating the thermal sensor (20) on the top side (18) of the printed circuit board (10) with respect to his intended purpose of achieving accurate temperature measurements. Because Nagaraj teaches away from locating the thermal sensor (20) on the top side (18) of the printed circuit board (10) with respect to his intended purpose of achieving accurate temperature measurements, there is no motivation in Nagaraj to make the modification proposed by the rejection. Because Nagaraj does not teach or suggest securing the thermocouple directly to the active circuit surface of the semiconductor die, and because Nagaraj teaches away from the modification proposed by the rejection, Claims 1, 4 and 5 are not obvious under 35 U.S.C. § 103(a) over admitted prior art (APA) and Nagaraj.

The rejection avoids considering the loss of measurement accuracy that would result from the proposed modification and alleges that the motivation is "to avoid damages due to over heating/over cooling that may affect the overall quality of the circuit". However, Nagaraj already

Amendment "D" page 6 of 8  
09/465,131

DOCKET NO. 99-099/RCE  
65611

teaches this advantage in column 2, lines 54-59 as follows:

"According to the present invention, a single thermal sensing device may be employed to detect the thermal characteristics of two integrated circuit devices, and thereby allow a thermal sensing system to provide instruction to counteract an 'overheat' condition for one or both devices."

Because Nagaraj already teaches a way to counteract overheating without the proposed modification, the alleged motivation is invalid.

Even if Nagaraj did not already teach the advantage alleged by the rejection to result from the proposed modification, the alleged motivation would still be invalid for securing the thermal sensor (20) directly to the active circuit surface of the semiconductor die of the system controller (25). Specifically, Nagaraj is directed to monitoring the temperature of an operating integrated circuit (25) (see column 4, lines 8-17, and FIGS. 4 and 5), which changes more slowly over time and over a smaller temperature range compared to the temperature of the active circuit surface of a semiconductor die in manufacturing during the claimed reflow process. Because the temperature of the die changes much more rapidly during the claimed reflow process than in operation, the location of the thermocouple is much more critical to the accuracy of the temperature measurements in the claimed reflow process than to applications that monitor slower and smaller variations in temperature, such as the operation of an integrated circuit. Because the location of the thermocouple is less critical in Nagaraj than in the claimed reflow process, Nagaraj would realize no apparent

Amendment "D" page 7 of 8  
09/465,131

DOCKET NO. 99-099/RCE  
65611

benefit from the modification proposed by the rejection even if motivation could be found for making such a modification, and even if the proposed modification would arrive at the claimed invention. Because Nagaraj would realize no apparent benefit from the modification proposed by the rejection, there is no motivation to make the modification proposed by the rejection.

As explained above, the motivation alleged by the rejection is invalid because Nagaraj already teaches the advantage that would allegedly result from the proposed modification and because Nagaraj would not benefit from locating the thermal sensor (20) directly on the active circuit surface of the system controller (25). Because the proposed modification fails to arrive at the claimed invention, and because there is no motivation established in the cited prior art for locating the claimed thermocouple directly on the claimed active circuit surface of a semiconductor die, the rejection fails to meet the criteria required for a rejection of obviousness under 35 U.S.C. § 103.

The rejection of Claim 6 is traversed as explained above with regard to the rejection of Claim 1.

If an independent claim is nonobvious under § 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Claims 2, 3, 4, and 7 are dependent on Claims 1 and 6 and are therefore non-obvious under 35 U.S.C. § 103.

#### Conclusion

In summary, the rejection of Claims 1-7 is based upon a proposed modification of Nagaraj which does not arrive at the claimed invention and for which no reasonable motivation has been shown to exist in Nagaraj. Because

Amendment "D" page 8 of 8  
09/465,131

DOCKET NO. 99-099/RCE  
65611

Nagaraj does not teach or suggest securing a thermocouple directly to the active circuit surface of a semiconductor die, and because there is no motivation to modify Nagaraj to arrive at the claimed invention, Claims 1-7 are not obvious under 35 U.S.C. § 103(a).

No additional fee is required for this amendment.

In view of the above, Applicant submits that Claims 1-7 are in condition for allowance, and prompt and favorable action is earnestly solicited.

Respectfully submitted,



Eric James Whitesell  
Reg. No. 38,657

Address all correspondence to:  
LSI Logic Corporation  
1551 McCarthy Blvd., MS: D-106  
Milpitas, CA 95035

Direct telephone inquiries to:  
Leo J. Peters  
LSI Logic Corporation  
(408) 433-4578

FAX COPY RECEIVED

MAY 01 2002

TECHNOLOGY CENTER 2800